
FULL TEXT OF CASES (USPQ FIRST SERIES)

In re DAVIES AND HOPKINS, 177 USPQ 381 (CCPA 1973)

In re DAVIES AND HOPKINS

(CCPA)

177 USPQ 381

Decided Apr. 5, 1973

No. 8836

U.S. Court of Customs and Patent Appeals

Headnotes

PATENTS

1. Patentability — Composition of matter (§ 51.30)

Prima facie obviousness can be rebutted by evidence of unexpected properties of composition; however, basic property or utility must be disclosed in order for affidavit evidence of unexpected properties to be offered.

2. Applications for patent — Continuing (§ 15.3)

Interference — Reduction to practice — Constructive reduction (§ 41.755)

Specification — Sufficiency of disclosure (§ 62.7)

There is no specific statutory requirement that compels applicant to disclose all properties of chemical compounds or compositions in his application; insofar as statute is concerned, only disclosure requirements are in first paragraph of 35 U.S.C. 112; however, public will derive the most benefit from a patent when it discloses on its face those properties or utilitarian advantages which were ultimately persuasive on question of nonobviousness; when applicant has satisfied section 112, court would be reluctant to require him to disclose more unless it could be done without prejudice to him; but if he can be required to include properties in specification without prejudice to him, a compromise is reached upon which evidentiary ruling can be based; such a compromise is possible as there is no impediment to prevent applicant's refiling application and incorporating a discussion of allegedly unobvious properties while retaining effective date of instant application under section 120; since instant application ostensibly complies with section 112 and since subject matter to be claimed in subsequently filed application would be identical to that claimed in instant application, later application would be entitled to prior application's filing date; newly disclosed properties do not alter subject matter sought to be patented; rejection of claims for obviousness is affirmed, since affidavit evidence relating to after-discovered properties should not be considered in instant application.

Particular patents—Polystyrene

Davies and Hopkins, Improved Polystyrene, claims 7, 13, and 19 to 23 of application refused.

Case History and Disposition:

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Appeal from Board of Appeals of the Patent Office.

Application for patent of Thomas Ellis Davies and Hubert Brian Hopkins, Serial No. 651,660 filed July 7, 1967; Patent Office Group 145. From decision rejecting claims 7, 13, and 19 to 23, applicants appeal. Affirmed.

Attorneys:

BERND W. SANDT, Midland, Mich., for appellants.

S. WM. COCHRAN (FRED E. MCKELVEY of counsel) for Commissioner of Patents.

Judge:

Before MARKEY, Chief Judge, and RICH, ALMOND, BALDWIN, and LANE, Associate Judges.

Opinion Text

Opinion By:

ALMOND, Senior Judge.

This is an appeal from the decision of the Patent Office Board of Appeals sustaining the examiner's rejection of claims 1-11 and 13-23, all the claims in appellants' application ¹entitled "Improved Polystyrene." In their brief before this court, appellants "abandoned" their appeal insofar as it concerns claims 1-6, 8-11 and 14-18. Accordingly, the appeal is dismissed as to those claims. Claims 7, 13 and 19-23 remaining in the case stand rejected as unpatentable under 35 U.S.C. 103. For reasons appearing hereinafter, we affirm.

Appellants' invention relates to so-called "toughened styrene polymers." According to their specification, such polymers are made by polymerizing styrene with a comonomer, if desired, in the presence of a suitable toughening agent. This agent, a preformed rubbery polymer, is dissolved in the monomeric styrene and comonomer, if used, and the resulting solution is polymerized by a suitably initiated free radical process. The process is carried out in such a way that the bulk of the styrene and comonomer are polymerized to form a solid matrix of either a homopolymer or copolymer of styrene in which discrete particles of the rubber employed as a toughening agent are dispersed. A minor portion of the styrene is said to react with the rubber in a manner which crosslinks the latter.

The appealed claims are limited to compositions in which the toughening agent is a rubbery copolymer of styrene and butadiene wherein at least 30 percent of the butadiene portion is in the "cis" configuration. Claim 7 is representative:

7. A composition comprising a major proportion of a styrene polymer selected from the group consisting of homopolymers and copolymers of styrene and copolymers of the nuclear methyl substituted styrenes having a softening point greater than 70°C., and as a toughening agent a minor proportion of a butadiene/styrene copolymer containing a major proportion by weight of polymerized butadiene units in which at least

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30% of the polymerized butadiene units have the formula:

Graphic material consisting of a chemical formula or diagram set at this point is not available. See text in hard copy or call BNA PLUS at 1-800-452-7773 or 202-452-4323.

and the stereo configuration about the double bond is cis.

The repeating polymer unit derived from butadiene is in the cis configuration as shown in the claim, frozen there by the carbon-carbon double bond. Butadiene can polymerize in two other possible configurations, shown below, designated "trans" and "vinyl." ²

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The other appealed claims are in dependent form, all but one of which ultimately depends from an abandoned claim. The limitations added by them are not relevant to our discussion of this case.

The examiner and board relied upon six references in reaching their conclusion that the invention was obvious. They are:

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Appellants concede that the references make out a prima facie case of obviousness with regard to employing the copolymer toughening agent defined by the claims. Nevertheless, they urge that the claims are patentable in view of alleged unexpected properties found for the new compositions. These include improved mechanical properties such as tensile strength, impact strength, elongation and the like, as well as improved gloss, transparency and processability. It is further alleged that improvement in mechanical properties is normally at the expense of gloss, transparency and processability and vice versa. Therefore, to achieve improvements in both sets of properties is unexpected.

Amos discloses that homopolymers and copolymers of styrene can be toughened by polymerizing the corresponding monomer(s) in the presence of any rubber soluble in the monomer(s) chosen. Enumerated toughening agents include copolymers of butadiene and styrene but there is no mention of a butadiene polymer having a specific cis content.

Greene describes polymers of butadiene and similar monomers which contain a "predominant" portion of polymerized monomers in the cis form. An example is directed to the preparation of a copolymer of butadiene and styrene, but the cis content of the polymer is not given. The reference does not disclose that these polymers can be used as toughening agents.

Baum discloses that styrene can be polymerized in the presence of rubbery polymers, including butadiene-styrene copolymers, but attributes improved clarity of the product to the specific mode of polymerization employed. This reference does not indicate that the butadiene rubbers used should have a specific cis content.

Lunk discloses that toughened styrene polymers have improved properties if the toughening agent is a butadiene rubber in which the

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cis content is at least about 90%. He does not disclose that butadiene copolymers of high cis content can be employed as toughening agents.

The Schramm patent suggests that butadiene rubbers of high cis content (75% or more) can be used to strengthen products of a graft polymerization. According to appellants' specification, a graft polymerization is similar to the process described for toughening styrene.

Foster discloses rubbery butadiene-styrene copolymers having a cis content of at least about 29% which appellants concede would include the toughening agents of their invention. However, their use in this manner is not suggested by the reference.

Claim 7 was rejected as obvious over the combination of Lunk with Schramm and Foster. All the claims were rejected in view of the six references relied upon. The board summarized these rejections in this way:

In essence, the examiner holds that it would be obvious (35 U.S.C. 103) to use the polybutadienes of Foster or Greene as the rubbery modifiers in the styrene compositions of Baum or Amos et al. This holding does not require reliance on Schramm or Lunk. However, the Examiner further holds that the latter patents suggest improvement in properties if butadienes of higher cis-1,4 content are used as modifiers.

We agree, and appellants concede, that a prima facie case of obviousness has been established which must stand unless sufficient rebuttal evidence is offered. From the references cited, it is clear that a process for toughening polystyrene employing a butadiene-styrene copolymer was known to the prior art. It was also known that a homopolymer of butadiene having a high cis content could be used to achieve improved properties. Therefore, if there were no evidence to the contrary, we are of the opinion that it would be proper to conclude that it would have been obvious to employ a butadiene-styrene copolymer of the type claimed as a toughening agent for polystyrene.

Because the prior art suggests that the improved properties obtained using polybutadienes of high cis content as a toughening agent are attributed to that content, appellants assert that one skilled in the art might conclude that improved properties could also be achieved using the copolymers claimed by them. Presumably it is their view that this artisan would expect a lesser improvement because the styrene content would dilute the effect of the butadiene portion of the toughening agent in a degree proportional to the relative amount of each. The ultimate conclusion appellants would have us reach is that the improvements in properties alluded to above, i.e., the combination of improved mechanical properties plus improved gloss, transparency, and processability, are unexpected ones and are sufficient to rebut the prima facie obviousness established by the prior art.

[1]Appellants are correct in their belief that prima facie obviousness can be rebutted by evidence of unexpected properties. In *re Papesch*, 50 CCPA 1084, 315 F.2d 381, 137 USPQ 43 (1963). In this case, much of appellants' evidence of unexpected properties, and particularly that relating to improvements in gloss, transparency and processability, was presented to the Patent Office in the form of affidavits summarizing tests made after the application was filed. The board objected to much of this evidence on technical grounds. However, it refused to consider that portion of those affidavits showing improved gloss, etc., for the reason that these advantages were not disclosed in the application as originally filed. The board's authority for this was this court's decision in *In re Herr*, 50 CCPA 705, 304 F.2d 906, 134 USPQ 176 (1962).

We believe the board's decision is well founded. In reaching this conclusion, we note that appellants' specification indicates that mechanical properties of the toughened polymer are improved whenever a rubber containing butadiene of high cis content is used. The specification makes no attempt to indicate that the copolymers as now claimed are preferred over homopolymers of butadiene. In fact, the claims eventually abandoned were directed to polystyrene toughened by butadiene homopolymers. These claims were abandoned in the face of the prior art cited by the examiner. Apparently it was only in the face of the rejections based on this art that appellants were moved to attempt to distinguish the properties obtained using the copolymer as a toughening agent versus using a homopolymer of butadiene.

Appellants urge that their affidavits should be considered notwithstanding the fact that the properties in question were not disclosed in their original application. They correctly point out that the opinion in *Herr* does not say that evidence of undisclosed properties cannot be offered. Instead it quotes *In re Lundberg*, 45 CCPA 838, 253 F.2d 244, 117 USPQ 190 (1958), for the proposition that in such a case if "that advantage is not disclosed in appellant's application" he is "not in a favorable position to urge it as a basis for the allowance of claims."

Appellants find support for the proposition that Herr does not absolutely preclude introduction of undisclosed properties as evidence of unobviousness in the decisions of this court in *In re Zenitz*, 52 CCPA 746, 333 F.2d 924, 142 USPQ 158 (1964), and *In re Khelghatian*, 53 CCPA 1441, 364 F.2d 870, 150

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150 USPQ 661 (1966). However, we think their reliance upon those cases is misplaced. In *Zenitz* and *Khelghatian* the court accepted evidence of undisclosed advantages that "would inherently flow" from what was disclosed in the specification. We do not feel a similar situation exists here as we are of the view that the basic property or utility must be disclosed in order for affidavit evidence of unexpected properties to be offered. See *In re Lorenz*, 51 CCPA 1522, 333 F.2d 908, 142 USPQ 101 (1964).

It is difficult to see how one skilled in the art could conclude that the unexpected properties of improved gloss, transparency and processability find a basis in or inherently flow from the disclosure in the application that the toughened polystyrene has improved mechanical properties such as impact strength and the like. In the first place, the specification equates the effect of the homopolymers and copolymers of butadiene having a high cis content as toughening agents, whereas appellants now attempt to point out their differences. In the second place, appellants' own argument in support of patentability is that it is unexpected to achieve both improved mechanical properties and improved gloss, etc., since it is the prior art experience that improving one set of properties came at the expense of the other. Therefore, it can hardly be said that there is a disclosure of the basic properties of gloss, transparency or ease of processability in the disclosure that the compositions have improved mechanical properties.

The specification discloses that the toughened polystyrene, whether the toughening agent is a homopolymer or copolymer of butadiene, can be used wherever "moldings are required to bear loads, e.g., refrigeration liners." Particularly in view of the fact that the specification equates the homopolymers and copolymers as toughening agents, we do not consider this to be a statement of utility sufficiently clear to insure that others would be led to observe the improved properties which appellants now urge in support of their claims.

[2] We think it necessary to note that there is no specific statutory requirement that compels an applicant to disclose all properties of chemical compounds or compositions in his application. Insofar as the statute is concerned, the only disclosure requirements are defined in the first paragraph of 35 U.S.C. 112. There is no § 112 rejection in this case and, therefore, we assume that the specification satisfies the requirement that it describe the invention adequately to enable one skilled in the art to make and use it.

In effect, the holding of the board is an evidentiary ruling which must be supported, if at all, on considerations other than statutory requirements. Therefore, to be valid such a ruling must be supported by an interest strong enough to compel a recognition that, in at least certain cases, the disclosure requirements of § 112 are not the maximum that can be demanded in an application.

The solicitor, in his brief, suggests that the reason evidence of undisclosed properties should be excluded can be grounded upon public policy. In his view, if evidence such as that presented by appellants were allowed, patents would be granted without the necessary quid pro quo of disseminating the knowledge in that essential evidence to the public. That argument is weakened, however, by the fact that the evidence upon which nonobviousness is based does become public as a part of the available file history when the patent issues.

Nevertheless, the public will derive the most benefit from a patent when it discloses on its face those properties or utilitarian advantages which were ultimately persuasive on the question of nonobviousness. However, when, as here, an applicant has satisfied the requirements of § 112, we would be reluctant to require him to disclose more unless it could be done without prejudice to him. But if the applicant can be required to include the properties in his specification without prejudice to him, a compromise is reached upon which the evidentiary ruling can be based.

We think such a compromise is possible as we see no impediment to the present appellants' refiling their application and incorporating a discussion of the allegedly unobvious properties while retaining the effective date of the application involved here through § 120. That section requires that the prior application comply with the conditions set forth in the first paragraph of § 112 as regards the invention claimed in the later application. See *Martin v. Johnson*, 59 CCPA 769, 454 F.2d 746, 172 USPQ 391 (1972). As we have already noted, appellants' application has ostensibly met the requirements of § 112 as no rejection has been made based upon that section. Since the subject matter to be claimed in a subsequently filed application would be identical to that claimed here, the later application would be entitled to the benefit of the filing date of the application we now consider. See *In re Kirchner*, 49 CCPA 1234, 305 F.2d 897, 134 USPQ 324 (1962). We certainly do not think the newly disclosed properties alter the subject matter sought to be patented.

In view of the fact that we agree with the board that the affidavit evidence relating to the after-discovered properties should not be considered in this case, the case of prima facie obviousness established by the references is not

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rebutted. Accordingly, the decision of the board is *affirmed*.

Footnotes

Footnote 1. Serial No. 651,660, filed July 7, 1967 as a continuation-in-part of application serial No. 89,938 filed February 17, 1961.

Footnote 2. Typically a polymer of butadiene will contain at least some of each of the three types of repeating units. By varying the method of polymerization, one can be caused to predominate over the others.

- End of Case -

PATENT ABSTRACTS OF JAPAN(11)Publication number : **06-172690**(43)Date of publication of application : **21.06.1994**

(51)Int.Cl. **C09D 11/00**
C09D 11/02

(21)Application number : **04-326965**(71)Applicant : **SEIKO EPSON CORP**(22)Date of filing : **07.12.1992**(72)Inventor : **ONISHI HIROYUKI**
TAKEMOTO KIYOHICO
YOSHIKE ETSUKO
SERIZAWA NAOKI

(54) INK FOR INK JET RECORDING**(57)Abstract:**

PURPOSE: To provide an ink holding the excellent properties of an ethylene urea N-alkyl-substituted derivative, having a high printing quality and storage stability, and used for ink jet recording.

CONSTITUTION: The ink comprises water, a water-soluble dyestuff and/or a pigment, a polyhydric alcohol (hereinafter referred to as the component (a)), and an ethylene urea N-alkyl-substituted derivative (hereinafter referred to as the component (b)), the weight ratio of the components (a)/(b) being $\geq 1/2$, and the total weight amount of the components (a) and (b) being ≤ 25 wt.% based on the weight of the ink.

LEGAL STATUS

[Date of request for examination] 10.09.1999

[Date of sending the examiner's decision of rejection] 25.01.2002

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] Ink in which it is ink for ink-jet record characterized by providing the following, and the weight-composition ratio of a component (a) to a component (b) is 1/2 or more, and the sum total weight of a component (a) and a component (b) is characterized by being 25 or less % of the weight to the aforementioned ink. Water. A water soluble dye and/or a pigment. Polyhydric alcohol (henceforth a component (a)) N alkylation derivative of an ethylene urea (henceforth a component (b))

[Claim 2] Ink according to claim 1 chosen from the group which a component (a) becomes from a glycerol, a triethylene glycol, a polyethylene glycol, and a diethylene glycol.

[Claim 3] Ink according to claim 1 whose component (b) is 1 and 3-dimethyl-2-imidazolidinone.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001] Background of the Invention]

[Industrial Application] this invention relates to the ink for ink-jet record which especially contained 1 and 3-dimethyl-2-imidazolidinone about the ink for ink-jet record which contained N alkylation derivative of an ethylene urea as a solvent.

[0002]

[Description of the Prior Art] N alkylation derivative division 1 of an ethylene urea and 3-dimethyl-2-imidazolidinone have the property which was excellent as an organic solvent, and when this is used as a solvent of the ink for ink-jet record, they are supposed that improvement in record concentration, drought resistance, preservation stability, etc. can be aimed at (for example, JP,57-31759,B).

[0003] However, even if the performance for which ink-jet record ink is asked was improving and it was in conventional ink using these compounds as an organic solvent from this viewpoint recently, it was what leaves the room of improvement further about a quality of printed character and preservation stability.

[0004] [Summary of the Invention]

[Problem(s) to be Solved by the Invention] This invention persons found out that ink with a high quality of printed character and preservation stability was realizable by combining N alkylation derivative and polyhydric alcohol of an ethylene urea by specific composition, as a result of advancing further research on the ink for ink-jet record which used N alkylation derivative of an ethylene urea.

[0005] Therefore, this invention was made based on this knowledge, and it aims at offering the ink for ink-jet record which has a high quality of printed character and preservation stability, making the property which was excellent in N alkylation derivative of an ethylene urea hold.

[0006]

[Means for Solving the Problem] The ink for ink-jet record by this invention Water, a water soluble dye and/or a pigment, and polyhydric alcohol (henceforth a component (a)), It is ink for ink-jet record which comes to contain N alkylation derivative (henceforth a component (b)) of an ethylene urea. that to which the weight-composition ratio of a component (a) to a component (b) is 1/2 or more, and the sum total weight of a component (a) and a component (b) is characterized by being 25 or less % of the weight to the aforementioned ink -- it comes out

[0007] The ink for ink-jet record by the [concrete explanation of invention] this invention is water color ink which comes to contain water, a water soluble dye, and/or a pigment, and comes to contain N alkylation derivative (for it to be hereafter called a component (b)) of polyhydric alcohol (it may be hereafter called a component (a)) and an ethylene urea further.

[0008] the weight-composition ratio [as opposed to / if it is in the ink by this invention / a component (b)] of a component (a) -- 1/2 or more -- desirable -- 1/4 -- more -- desirable -- 1 - 5/2 -- it is 1 - 4/2 most preferably, and the sum total weight of a component (a) and a component (b) is more preferably made into 15 % of the weight 20 or less % of the weight 25 or less % of the weight to ink [2-4] If (Component a) / component (b) is less than one half, the attack nature of 1 and 3-dimethyl-2-imidazolidinone cannot be suppressed, and it is not desirable. Moreover, since a quality of printed character will deteriorate if the sum total weight of a component (a) and a component (b) exceeds 25 % of the weight to ink, it is not desirable.

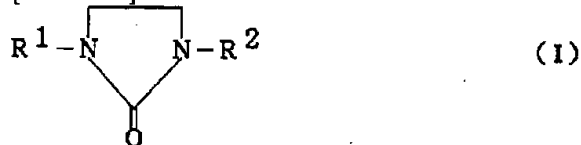
[0009] Since a high quality of printed character is realizable the attack nature of N alkylation derivative of an ethylene urea is suppressed, and ink does not invade the head and ink passage of an ink-jet recording device which were constituted by the various kinds of polymeric-materials, for example, poly ape phon, polyether ape phon, amorphous polyolefine, and poly-ether ether ketone, a polyarylate, polyethylene, polypropylene, an ethylene vinylacetate copolymer, polystyrene, a polyacetal, isobutylene isoprene rubber, polyurethane, etc., and simultaneous according to the ink by this invention, it is desirable. A remarkable effect is acquired in the ink-jet recording head in which a part of [at least] wall material which forms the pressure room which can say it also as the core of an ink-jet recording head especially was formed by polymeric materials. Moreover, according to the ink by this invention, the width of face of the material in contact with ink and selection spreads, and it also becomes possible to manufacture them with a comparatively cheap material. Furthermore, it is filled up with a polyurethane foam and it becomes possible to use the ink cartridge constituted so that ink might be infiltrated into this and it might be made to hold.

[0010] As for the polyhydric alcohol as a component (a), a glycerol, a triethylene glycol, a polyethylene glycol, a diethylene glycol, ethylene glycol, a propylene glycol, etc. are mentioned. As a desirable example, a glycerol, a triethylene glycol, a polyethylene glycol, and a diethylene glycol are mentioned especially. These may be used as two or more sorts of mixture, even if independent. Moreover, the addition to the ink of a component (a) has 1 - 20 desirable % of the weight, and it is 2 - 5% of the weight of a range more preferably. Blinding cannot occur that the addition of a component (a) is less than 1 % of the weight, or the attack nature of N alkylation derivative of an ethylene urea cannot be suppressed, and it is not desirable. Moreover, since quick-drying [of printing] will get worse if 20 % of the weight is exceeded, it is not desirable.

[0011] The example of N alkylation derivative of the ethylene urea as a component (b) is a compound expressed with the following general formula (I).

[0012]

[Formula 1]



(R1 and R2 express independently a hydrogen atom, or C1 - 4 alkyl groups among a formula, and they are a methyl and ethyl preferably)

Both the most desirable compounds are 1 and 3-dimethyl-2-imidazolidinone R1 and whose R2 are methyl groups.

[0013] The addition of N alkylation derivative of an ethylene urea has 0.5 - 20 desirable % of the weight, and it is 1 - 15% of the weight of a range more preferably. Especially, the addition in the case of 1 and 3-dimethyl-2-imidazolidinone has 0.5 - 15 desirable % of the weight, and it is 1 - 5% of the weight of a range more preferably. N alkylation derivative of this ethylene urea has high color solubility, and has the effect which enlarges color concentration and can make record concentration high. Moreover, since N alkylation derivative of an ethylene urea is hypoviscosity, it can suppress rapid viscosity elevation, and it can raise a quality of printed character, continuation, and intermittent printing stability. Furthermore, N alkylation derivative of an ethylene urea also has the effect which raises the water resistance of printing.

[0014] The fundamental solvent of the ink by this invention is water, and its thing [ion / magnesium / calcium ion and] using ion exchange water 5 ppm or less is more desirable. The addition is 75 - 90 % of the weight preferably 70 to 95% of the weight. Since it will become or a printing drying property will get worse that it is easy to generate blinding if it is difficult to secure a desirable quality of printed character with it being less than 70 % of the weight and it exceeds 95 % of the weight, it is not desirable.

[0015] The water soluble dye currently used for the conventional ink for ink-jet record as a color contained in the ink by this invention can be used. As an example of a color, for example C. The I. direct yellow 1, 8, 11, 12, 24, 26, 27, 28, 33, 39, 44, 50, 58, 85, 86, 87, 88, 89, 98, and 157, C.I. direct red 1, 2, 4, 9, 11, 13, 17, 20, 23, 24, 28, 31, and 33, 37, 39, 44, 46, 62, 63, 75, 79, 80, 81, 83, 84, 89, 95, 99, 113, 197, 201, 218, 220, 224, 225, 226, 227, 228, 229, 230, 231, the C.I. direct blues 1, 2, 6, 15, and 22, 25, 41, 71, 76, 78, 86, 87, 90, 98, 163, 165, 199, 202, the C.I. direct blacks 2, 7, 19, 22, 24, 32, 38, 51, 56, 63, 71, 74, 75, 77, 108, 154, 168, and 171, C. The I. acid yellow 1, 3, 7, 11, 17, 19, 23, 25, 29, 38, 44, 79, 127, 144, and 245, the C.I. acid reds 1, 6, 8, 9, 13, 14, 18, 26, 27, 35, 37, 42, 52, 82, 85, 87, 89, 92, and 97, 106, 111, 114, 115, 118, 134, 158, 186, 249, 254, 289, the C.I. acid blues 1, 7, 9, 22, 23, 25, 29, 40, 41, 43, 45, 78, 80, 82, 92, 93, 127, and 249, C. The I. acid blacks 1, 2, 7, 24, 26, 29, 31, 44, 48, 50, 52, and 94, the C.I. basic yellow 1, 2, 11, and 34, the C.I. basic red 1, 2, 9, 12, 14, 17, 18, and 37, C.I. basic blues 1, 3, 5, and 7, 9, 22, 24, 25, 26, 28, 29, the C.I. basic blacks 2 and 8, the C.I. hood blacks 1 and 2, the C.I. hood blue 2, the C.I. hood violet 2, the hood red 14, the C.I. hood yellow 4, the C.I. reactive yellow 37, C. The I. reactive red 23 and 180 and C.I. reactive black 31 grade are mentioned.

[0016] Moreover, as an example of a desirable pigment, an inorganic pigment (carbon black), an organic pigment (peri non insoluble azo pigment, soluble azo pigment, a phthalocyanine system pigment, an isoindolinone system pigment, a Quinacridone pigment, a system pigment, a perylene system pigment), etc. are mentioned. In addition, the processing pigments (graft carbon etc.) which processed the pigment front face by the resin etc. can also be used.

[0017] especially -- as an inorganic pigment -- acid carbon black (the Mitsubishi Kasei make -- MA-100, #1000, 7, 8 and 11, and the product made from Colon Behan carbon -- Raven-1255, 1250, 1060, 1035, 1040, 1020, 1000 and 760, and graft carbon gpt-505 made from **** industry P grade are suitable)

[0018] As an organic pigment, the C.I. pigment yellow 1, 2, 3, 5, 12, 13, 14, 15, 17, and 83, the C.I. pigment red 1, 2, 3, 4, 5, 7, 9, 12, 22, 23, 37, 38, 81, and 146, the C.I. pigment blues 1, 2, 15, 16, and 17, and C.I. pigment black 1 grade are suitable.

[0019] Especially [as possible] the addition of a color and a pigment is 0.5 - 5.0% of the weight of a range preferably [that it is generally in 0.01 - 10% of the weight of the range], and more preferably, although printing record is not limited.

[0020] According to the mode with a still more desirable this invention, it is desirable to add the penetrating agent which promotes osmosis of the ink to record material. Alcohol is mentioned as a desirable example of a penetrating agent.

Especially, four or less-carbon number monohydric alcohol, for example, a methanol, ethanol, n-propanol, iso-propanol, a butanol, etc. are mentioned. Ethanol is especially desirable especially from a viewpoint of permeability over safety, an odor,

and record material.

[0021] The addition of four or less-carbon number monohydric alcohol has 1 - 10 desirable % of the weight, and it is 2 - 7% of the weight of a range more preferably. Sufficient permeability for ink and evaporative power cannot be given as the addition of alcohol is less than 1 % of the weight, but there is a possibility that the drying property of printing may get worse. Moreover, if 10 % of the weight is exceeded, since it will become difficult to secure a good quality of printed character and the flash point of ink will be reduced, it is not desirable from a viewpoint of safety. The combination of N alkylation derivative of an ethylene urea and four or less-carbon number alcohol makes the viscosity of ink increase further again. Consequently, if it is in the ink by this invention, it is advantageous also at the point which does not need especially addition of a thickener.

[0022] Furthermore, such a trouble is also conquerable by the ink using N alkylation derivative of this ethylene urea lacking in pH stability generally, and making it coexist with four or less carbon number [of said amount of specification] monohydric alcohol, although it had the trouble that a foreign matter was generated. Moreover, N alkylation derivative of an ethylene urea is advantageous also at the point which can lessen the addition of the alcohol comparatively, consequently can constitute safe ink with the high flash point from the penetrating power to record material being high when adding alcohol as a penetrating agent, as described above.

[0023] The ink by this invention may contain the third component for improving the property further. As an example of the third component which can be added, a surfactant, a viscosity controlling agent, a surface tension regulator, a specific resistance regulator, pH regulators (for example, a lithium hydroxide, a sodium hydroxide, a potassium hydroxide, etc.), an antifungal agent, a chelating agent, etc. are mentioned.

[0024] Although many physical properties of the ink by this invention may be suitably set up so that it may be suitable for ink-jet record, it is desirable that they are 30 or less mPa-s in temperature, and in order for ink viscosity to be high-speed responsibility (part for for example, A4 size 2 page/) realization, it is desirable [viscosity] at the time of a 0-50-degree C operation, that they are about 1.2-20 mPa-s, for example. Moreover, as for the surface tension of ink, it is desirable that it is in about 35-60 dyne/cm in temperature at the time of a 0-50-degree C operation, and, as for pH, it is desirable that it is about in seven to ten.

[0025] After the ink by this invention is printed by record material, suitable heat fixing meanses (for example, hot blast, a heating roller, infrared radiation, etc.) may be dried and fixed to it.

[0026] After the ink for ink-jet record by this invention mixes the above-mentioned constituent and stirs it enough under a room temperature - heating, it can be manufactured by removing a formed element by **** by the case. Moreover, when adding alcohol as an ink component, it is low temperature comparatively, and it is 40 degrees C or less in temperature preferably, and it is desirable to add and stir alcohol.

[0027]

[Example] Although the following examples explain this invention still more concretely, this invention is not limited to these examples.

The ink of composition as shown in examples 1-10 and the example 1 of comparison - the 14 1st table was obtained as follows. Here, all of the color of all ink were the C.I. direct black 19, and the content was made into 3 % of the weight, and used 1 and 3-dimethyl-2-imidazolidinone (DMI) as a component (b). Furthermore, all ink contains ethanol 5% of the weight. In front Naka, TEG and the polyethylene glycol were abbreviated to PEG and the triethylene glycol abbreviated the diethylene glycol to DEG.

[0028] First, heating stirring of the components other than ethanol was carried out at 80 degrees C for 1 hour. Then, cooling water was circulated for about 1 hour, and it cooled, after making temperature of ink into 40 degrees C, ethanol was added, and it stirred for about 30 minutes after that. Reduced pressure **** of the mixture was carried out using the 0.4-micrometer membrane filter, and it considered as ink.

[0029] It evaluated as follows about (1) quality of printed character and (2) carriage-return nature using ink jet printer BJ-330 (canon incorporated company make) (BJ330 is the head of a photosensitive epoxy acrylate system dry film) using the ink of an evaluation examination example and the example of comparison. In addition, it investigated about the paper Europe, the United States, and whose Japan total [ten kinds of] 30 respectively about a quality of printed character.

[0030] Moreover, vacuum substitution restoration of the ink of an example 6 and the example 4 of comparison was carried out at the ink cartridge (ether system polyurethane foam for sinking in and holding ink) of ink jet printer BJ-10V, and it evaluated about the existence of physical-properties change of (3) ink and foreign matter generating.

[0031] An evaluation result is as being shown in the 1st table.

(1) Printing was observed by the observation and viewing by 100 times and 400 times under a quality-of-printed-character evaluation microscope. consequently, there is also no bleeding to which there is also no bleeding which met fiber and the paper with a sharp edge met more than O:80%O:60-79%**40-59%:fiber, and paper with a sharp edge could be 39% or less [0032] (2) The carriage return nature printer was left for one month in the 70-degree C thermostat, and the number of times of cleaning until printing is recovered completely was measured. Result [the] O: It was presupposed that it does not return or return [the less than five number of times of return O:cleaning] completely [in the ten number of times or more of return x:cleaning] completely 5 times or more by the less than ten number of times of return **:cleaning 3 times or more by the less than three number of times of cleaning.

[0033] (3) Measurement of the ink viscosity, surface tension, and pH of the cartridge left for one week in the thermostat of 70

degrees C of ink physical-properties change and generating of a foreign matter were investigated. Consequently, O: Ink physical properties and foreign matter generating have change in change-less **:ink physical properties at x:ink physical properties with change, and the foreign matter considered as generating.

[0034]

[Table 1]

第 1 表

	混 合 溶 剤			イオン交換水 (重量%)	(1) 印字品質	(2) 印字復帰性	(3) インク物性 変化
	成分 (a)	成分 (a) / 成分 (b)	添加量 (重量%)				
実施例 1 A	グリセリン	1/2	10	82	◎80%	◎	◎
B	TEG				◎80%	◎	◎
C	PEG				○78%	◎	◎
D	DEG				○76%	◎	◎
実施例 2 A	グリセリン	1/2	20	72	○78%	◎	◎
B	TEG				○75%	◎	◎
C	PEG				○72%	◎	◎
D	DEG				○70%	◎	◎
比較例 1 A	グリセリン	1/2	30	62	△55%	◎	◎
B	TEG				△53%	◎	◎
C	PEG				△52%	◎	◎
D	DEG				△50%	◎	◎
実施例 3 A	グリセリン	1/1	10	82	◎90%	◎	◎
B	TEG				◎81%	◎	◎
C	PEG				○78%	◎	◎
D	DEG				○75%	◎	◎
実施例 4 A	グリセリン	1/1	20	72	○78%	◎	◎
B	TEG				○75%	◎	◎
C	PEG				○73%	◎	◎
D	DEG				○70%	◎	◎
比較例 2 A	グリセリン	1/1	30	62	△58%	◎	◎
B	TEG				△53%	◎	◎
C	PEG				△51%	◎	◎
D	DEG				△50%	◎	◎
実施例 5 A	グリセリン	2/1	10	82	◎85%	◎	◎
B	TEG				◎80%	◎	◎
C	PEG				○78%	◎	◎
D	DEG				○75%	◎	◎

[0035]

[Table 2]

第1表 (つづき)

	混 合 溶 剤			イオン交換水 (重量%)	(1) 印字品質	(2) 印字復帰性	(3) インク物性 変化
	成分 (a)	成分 (a) / 成分 (b)	添加量 (重量%)				
実施例6A	グリセリン				○78%	◎	◎
B	TEG	2/1	20	72	○76%	◎	◎
C	PEG				○75%	◎	◎
D	DEG				○72%	◎	◎
比較例3A	グリセリン				△59%	◎	◎
B	TEG	2/1	30	62	△57%	◎	◎
C	PEG				△55%	◎	◎
D	DEG				△53%	◎	◎
実施例7A	グリセリン				◎85%	◎	◎
B	TEG	3/1	10	82	◎83%	◎	◎
C	PEG				○79%	◎	◎
D	DEG				○78%	◎	◎
実施例8A	グリセリン				◎80%	◎	◎
B	TEG	3/1	20	72	○76%	◎	◎
C	PEG				○74%	◎	◎
D	DEG				○73%	◎	◎
比較例4A	グリセリン				△58%	◎	◎
B	TEG	3/1	30	62	△56%	◎	◎
C	PEG				△55%	◎	◎
D	DEG				△53%	◎	◎
実施例9A	グリセリン				◎85%	◎	◎
B	TEG	4/1	10	82	◎83%	◎	◎
C	PEG				○79%	◎	◎
D	DEG				○78%	◎	◎
実施例10A	グリセリン				◎80%	◎	◎
B	TEG	4/1	20	72	○76%	◎	◎
C	PEG				○74%	◎	◎
D	DEG				○73%	◎	◎

[0036]

[Table 3]

第1表 (つづき)

	混 合 溶 剤		添加量 (重量%)	イオン交換水 (重量%)	(1) 印字品質	(2) 印字復帰性	(3) インク物性 変化
	成分 (a)	成分 (a) / 成分 (b)					
比較例5A	グリセリン	4/1	30	62	△58%	◎	◎
B	TEG				△56%	◎	◎
C	PEG				△55%	◎	◎
D	DEG				△53%	◎	◎
比較例6		DMIのみ	10	82	△51%	○	△
比較例7		DMIのみ	20	72	△48%	○	×
実施例8		DMIのみ	30	62	×35%	×	×
比較例9A	グリセリン	1/3	10	82	○65%	○	△
B	TEG				○63%	○	△
C	PEG				○62%	○	△
比較例10A	グリセリン	1/3	20	72	△55%	○	△
B	TEG				△52%	○	△
C	PEG				△50%	○	△
D	DEG				△48%	○	△
比較例11A	グリセリン	1/3	30	62	△48%	△	△
B	TEG				△46%	△	△
C	PEG				△45%	△	△
D	DEG				△43%	△	△
比較例12A	グリセリン	1/4	10	82	△55%	△	△
B	TEG				△53%	△	△
C	PEG				△51%	△	△
D	DEG				△50%	△	△
比較例13A	グリセリン	1/4	20	72	△48%	△	△
B	TEG				△45%	△	△
C	PEG				△43%	△	△
D	DEG				△41%	△	△
比較例14A	グリセリン	1/4	30	62	△40%	△	△
B	TEG				×38%	△	×
C	PEG				×38%	△	×
D	DEG				×37%	△	×

[Translation done.]

FULL TEXT OF CASES (USPQ2D)

All Other Cases

In re Chu (CA FC) 36 USPQ2d 1089 (9/14/1995)

In re Chu (CA FC) 36 USPQ2d 1089

In re Chu

U.S. Court of Appeals Federal Circuit

36 USPQ2d 1089

Decided September 14, 1995

No. 95-1038

Headnotes

PATENTS

1. Patentability/Validity -- Specification -- Written description (§ 115.1103)

Patentability/Validity -- Inventorship (§ 115.13)

Board of Patent Appeals and Interferences erred by holding that applicants are

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not entitled to benefit of filing date of existing patent on ground that patent and application lack complete identity of inventorship, since there is overlap in inventive entities of patent and application, which claims to be continuation in part of patent, and since 35 USC 120 plainly allows continuation, divisional, and continuation in part applications to be filed and afforded filing date of parent even though parent and subsequent applications do not share complete identity of inventorship; patent is nevertheless available as prior art against application, since patent does not disclose subject matter of application claims at issue as required by 35 USC 112.

2. Patentability/Validity -- Obviousness -- In general (§ 115.0901)

Patentability/Validity -- Obviousness -- Evidence of (§ 115.0906)

Board of Patent Appeals and Interferences erred, in upholding obviousness rejection of application claims, by concluding that claims' disclosure was matter of "design choice," and that applicants' evidence and arguments to contrary are not present in specification and are therefore unpersuasive, since board is required to consider totality of record and is not free to disregard evidence and arguments presented by applicants, and since there is no support for proposition that evidence and/or arguments traversing 35 USC 103 rejection must be contained within specification, given that obviousness is determined by totality of record including, in some instances most significantly, evidence and arguments proffered during give-and- take of ex parte patent prosecution.

3. Patentability/Validity -- Obviousness -- Relevant prior art -- Particular inventions (§ 115.0903.03)

Placement of selective catalytic reduction catalyst within bag retainers in fabric filter house of apparatus used to control emissions from fossil fuel boilers, as taught by claims in application, would not have been matter of "design choice" and therefore obvious, since there is no teaching or suggestion in prior art that would lead one of ordinary skill to modify structure of prior art reference to place SCR catalyst within bag retainer, rather than between two filter bags as disclosed in that reference, and since technical evidence presented by applicants relating to frailty of fabric filters during pulse-jet cleaning clearly militates against conclusion that placement of catalyst in filter baghouse is mere "design choice."

Case History and Disposition:

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Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences.

Patent application of Paul Chu, William Downs, John B. Doyle and Peter V. Smith, serial no. 07/593,546. From decision of Board of Patent Appeals and Interferences upholding examiner's final rejection of application claims 1, 2, 12 and 14, applicants appeal. Reversed.

Attorneys:

Daniel S. Kalka, of McDermott Inc., Barberton, Ohio; Peter C. Michalos, of Notaro & Michalos, New York, N.Y., for appellant.

Nancy J. Linck; Albin F. Drost, deputy solicitor, Scott A. Chambers, associate solicitor, and La Vonda R. De Witt, Patent and Trademark Office, for appellee.

Judge:

Before Rich, circuit judge, Skelton, senior circuit judge, and Newman, circuit judge.

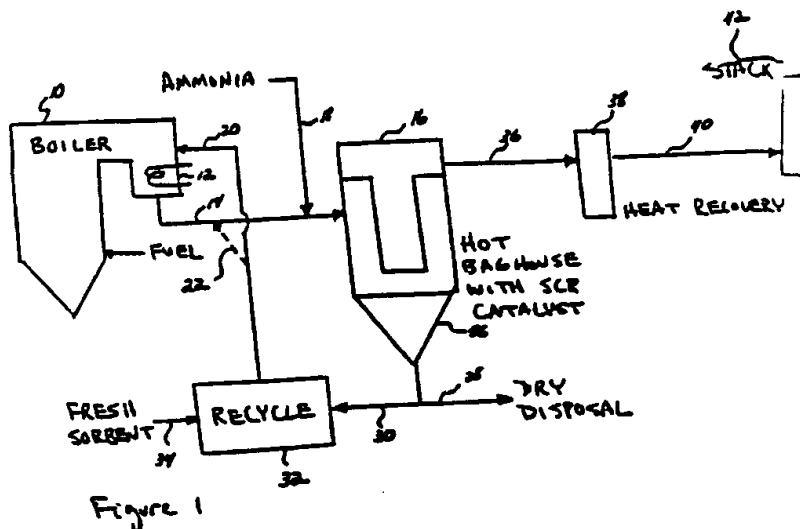
Opinion Text**Opinion By:**

Rich, J.

Paul Chu, William Downs, John B. Doyle, and Peter V. Smith (collectively Chu) appeal the August 9, 1994 decision of the Board of Patent Appeals and Interferences (Board) of the United States Patent and Trademark Office (PTO) affirming the Examiner's final rejection of claims 1, 2, 12, and 14 of patent application Serial No. 07/593,546 (the '546 application). 1 We reverse.

I. Background**A. The Invention**

Chu's invention relates to an apparatus used to control emissions, such as sulfur oxides (SO_x), oxides of nitrogen (NO_x), and particulates, such as fly ash, from fossil fuel boilers. Fig. 1 of the '546 application is reproduced below.



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The apparatus includes a fossil fuel fired boiler 10 containing an economizer 12 which receives combustion flue gas therefrom. The flue gas is input via exhaust duct 14 to a fabric filter house or baghouse 16 where it is cleaned, as described in greater detail below. Ammoniacal compounds are also input to the baghouse 16 through duct 14 at point 18. Sorbent is input to the boiler 10 either upstream of the economizer 12 at point 20 or downstream of the economizer 12 at point 22 depending on the particular sorbent chosen. After exiting baghouse 16, the clean flue gas proceeds along duct 36 to heat transfer device 38 which lowers the exit gas temperature. The flue gas then exits along duct 40 to the stack 42 where it passes to the environment.

Fig. 2 of the '546 application is a partial cross section of baghouse 16.



The baghouse 16 contains suitable fabric filters, such as filter bags 26. A selective catalytic reduction (SCR) catalyst 24, not shown in Fig. 2, is incorporated into the baghouse 16. The SCR catalyst 24 is located in the exhaust plenum of the baghouse 16, or, preferably, inside the filter bags 26.

Figs. 6-9 show alternative embodiments of apparatus for placement of the SCR catalyst 24 within each filter bag 26 of the baghouse 16. Fig. 6 is exemplary and is reproduced below.

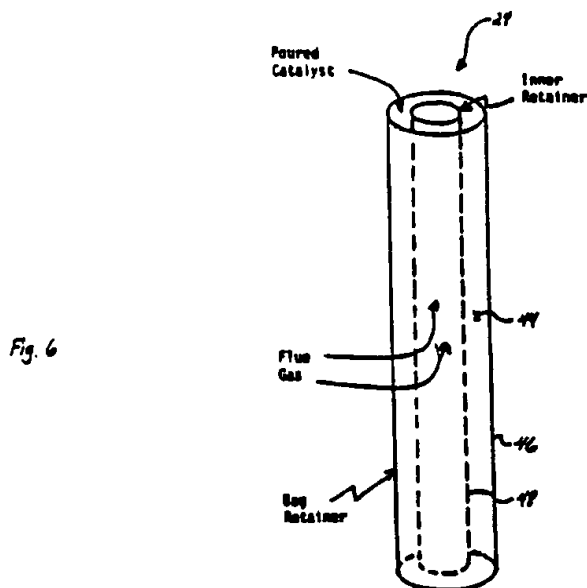


Fig. 6 shows a catalyst bed 44, or bag retainer, formed of concentric cylinders 46 and 48, each constructed of a porous material such as a perforated metal plate. The filter bag 26 encloses the bag retainer. The SCR catalyst 24 is placed in the space between cylinders 46 and 48. Flue gas flows up through the cylinders 46 and 48, as shown. The particulates and sorbent collect on the filter bags 26 to form filter cakes. To clean the filter bags 26 the '546 application discloses a pulse-jet cleaning system wherein a pulse of high-pressure air is blown into the bag retainer. The surface of each filter bag 26 is thereby cleaned and the filter cakes are discharged into a hopper 56.

Claim 1, the only independent claim at issue, recites:

1. An apparatus for controlling emissions of a fossil fuel fired boiler which produces flue gases containing SO_x, NO_x, and particulates, comprising:

a flue gas duct constructed so as to carry flue gases from a boiler to a stack for discharge;

a high-temperature pulse jet fabric filter house connected along the flue gas duct between the boiler and the stack constructed so as to remove particulate from the flue gas passing along the flue gas duct, said fabric filter house having a

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plurality of fabric filter bags contained therein with each of said fabric filter bags having a bag retainer situated therein;

a selective catalytic reduction catalyst positioned inside the bag retainer of each of said fabric filter bags in said filter house;

means for recovering heat connected along the flue gas duct downstream of said fabric filter house, said heat recovering means constructed so as to be heated by the flue gases in the flue gas duct;

means for injecting an ammoniacal compound into the flue gas duct upstream of said filter house; and

means for injecting sorbent into the flue gas duct upstream of the filter house whereby the sorbent reacts with SO_x, the particulates are removed in said fabric filter house, thus protecting the NO_x reduction catalyst from fly ash erosion and SO_x poisoning.

B. The Prosecution

The Examiner rejected claims 1, 2, 12, and 14 under 35 U.S.C. Section 103 (1988) as being unpatentable over U.S. Patent No. 4,871,522 issued to Doyle in view of U.S. Patent No. 4,874,586 issued to Szymanski et al. (Szymanski). The Examiner stated that Doyle discloses all elements of claim 1 but "fails to disclose a baghouse filters [sic] having a catalyst located within the filter, and is silent on specific baghouse filter design." The Examiner asserted, however, that Szymanski teaches "a baghouse filter similar to those of the instant claims" and that "[o]ne of ordinary skill in the art would have modified the [Doyle] apparatus to incorporate the baghouse filters of [Szymanski] to facilitate simultaneous removal of sulfur oxides and particulates on the filter and nitrogen oxides through the catalytic bed, disposed within the filters."

In response to the rejection, Chu first argued that the subject application "claims the benefit of the filing date as a continuation-in-part of [the Doyle patent]" such that the use of the Doyle patent "as a reference should be limited only to the new matter claimed in the continuation-in-part application."

As to the merits of the rejection, Chu contended that Doyle teaches placing the SCR catalyst in a heat exchanger downstream from the fabric filter house. Chu also argued that Szymanski "adds nothing to the foregoing reference since it merely teaches . . . incorporating an SCR catalyst into the filter fabric of a filter bag." Chu maintained that neither Doyle nor Szymanski teaches or suggests positioning the SCR catalyst inside the bag retainer of the filter bags as claimed. This feature is significant, according to Chu, because the bag retainers provide support and prevent the filter bags from collapsing during pulse-jet cleaning.

C. The Board's Decision

The Board first addressed whether the Doyle patent is available as prior art against the '546 application. The Board concluded that "Doyle is available as a reference for its entire disclosure under 102(e)/103 as to the current application because it is the uncontroverted work of 'another' in this particular case." The Board reasoned that because the Doyle patent and the Chu application have different, albeit overlapping, inventive entities, the Doyle patent is necessarily the work of "another" as defined in 35 U.S.C. Section 102(e) (1988) and therefore available as prior art. That Chu claimed the benefit of Doyle's earlier filing date by claiming continuation-in-part (CIP) status under 35 U.S.C. Section 120 (1988) was found to be irrelevant, the Board stating that "an attempt to claim CIP status between applications which never shared the same inventive entity is unavailing as a means to overcome" a rejection under Section 103.

As to the merits of the Section 103 rejection, the Board agreed with the Examiner that Doyle discloses all the elements of independent claim 1 except an SCR catalyst positioned within a bag retainer. The Board found that Szymanski's relatively stiff meshed inner wall 32 is a bag retainer as that term would be understood by one of ordinary skill in the art. Thus, in Szymanski, the catalyst is located between the bag retainer 32 and the bag 30, whereas claim 1, by contrast, requires the catalyst to be "positioned inside the bag retainer."

The Board concluded that the change between situating the catalyst in between the bag and the bag retainer and within the bag retainer is a matter of "design choice" and affirmed the rejection of claim 1. As to dependent claims 2, 4, and 14, the Board held that as "appellants have not separately argued such claims with any reasonable degree of specificity apart from claim 1," those claims "will fall with claim 1." The rejection of claims 2, 4, and 14 was accordingly affirmed.

Chu appealed the Board's decision to this court. We have jurisdiction under 28 U.S.C. Section 1295(a)(4)(A) (1988).

II. Availability of Doyle as a Reference

A. Standard of Review

Statutory interpretation is a question of law which we review de novo. *In re*

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Kathawala, 9 F.3d 942, 945, 28 USPQ2d 1785, 1786 (Fed. Cir. 1993). In appeals from PTO rejections, the Board's findings are reviewed under the clearly erroneous standard. *In re Caveney*, 761 F.2d 671, 674, 226 USPQ 1, 3 (Fed. Cir. 1985).

B. Analysis

The threshold issue in this case is whether the Doyle patent is available as prior art against Chu's claims. Chu maintains that the instant application should be afforded the Doyle patent filing date with respect to "the disclosure of the Doyle application" because the instant application claims to be a CIP of the Doyle patent. According to Chu, affording Chu's application this filing date would remove the Doyle patent as a reference. However, the Board found, and the PTO argues on appeal, that Chu is not entitled to the benefit of the Doyle patent filing date because there is not the same inventive entity between the Doyle patent and the Chu application. We conclude that Doyle is a proper prior art reference, though not for the reasons advanced by the Board.

Section 104(b) of the Patent Law Amendments Act of 1984 struck the phrase "by the same inventor" from 35 U.S.C. Section 120 and substituted therefor the phrase "which is filed by an inventor or inventors named in the previously filed application." Patent Law Amendments Act of 1984, Pub. L. No. 98-622, sec. 104(b), Section 120, 98 Stat. 3383, 3385.

The legislative history of this amendment clearly explains its purpose.

Subsection (b) of section 105 2 amends section 120 of the patent law to provide that an application can obtain the benefit of the filing date of an earlier application when not all inventors named in the joint application are the same as named in the earlier application. This permits greater latitude in filing "divisional" applications. For example, if the previously filed application named inventors A and B as the inventors, a later application by either A or B could be filed during the pendency of the previously filed application and claim benefit of the previously filed application.

130 Cong. Rec. 28065, 28071 (1984), H.R. 6286, 98th Cong., 2d Sess. (1984), *reprinted in* 1984 U.S.C.C.A.N. 5827, 5835 (Section-by-Section Analysis: Patent Law Amendments of 1984).

[1] The 1984 amendment to Section 120 plainly allows continuation, divisional, and continuation-in-part applications to be filed and afforded the filing date of the parent application even though there is not complete identity of inventorship between the parent and subsequent applications. D. Chisum, *Patents* Section 13.07 (1995). Thus, the Board erred in requiring complete identity of inventorship between the Doyle patent and the Chu application in order for Chu to have the benefit of the Doyle patent's filing date. There is overlap in the inventive entities of the Doyle patent and the Chu application, which, after the 1984 amendment, is all that is required in terms of inventorship or "inventive entity" to have the benefit of an earlier filing date. But this does not determine whether Chu is entitled to the Doyle date. There is another requirement.

It is elementary patent law that a patent application is entitled to the benefit of the filing date of an earlier filed application only if the disclosure of the earlier application provides support for the claims of the later application, as required by 35 U.S.C. Section 112. 35 U.S.C. Section 120. *Mendenhall v. Cedarapids Inc.*, 5 F.3d 1557, 1566, 28 USPQ2d 1081, 1088-89 (Fed. Cir. 1993) ("A patentee cannot obtain the benefit of the filing date of an earlier application where the claims in issue could not have been made in the earlier application."), *cert. denied*, 114 S. Ct. 1540 (1994); *see also* *Litton Sys., Inc. v. Whirlpool Corp.*, 728 F.2d 1423, 1438, 221 USPQ 97, 106 (Fed. Cir. 1984) (discussing filing dates of CIP applications).

Thus, Chu is entitled to the benefit of the Doyle patent filing date only if the Doyle patent discloses the subject matter now *claimed* by Chu. This, however, is admitted by Chu not to be the case. In fact, Chu states that "the invention as now claimed[] was not described in the [Doyle] patent." Specifically, Chu concedes that "nothing in Doyle suggests that SCR catalyst be placed inside the bag filter." Therefore, independent claim 1, which includes this limitation, and dependent claims 2, 4, and 14, are not supported by the Doyle patent disclosure. Accordingly, Chu cannot obtain the benefit of the Doyle patent filing date for these claims and the Doyle patent was properly relied on as prior art.

III. The Merits of the Rejection

A. Standard of Review

Obviousness under section 103 is a question of law that we review de novo. *In re Donaldson Co.*, 16 F.3d 1189, 1192, 29

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USPQ2d 1845, 1848 (Fed. Cir. 1994) (in banc). What a reference teaches is a question of fact reviewed under the clearly erroneous standard. *In re Beattie*, 974 F.2d 1309, 1311, 24 USPQ2d 1040, 1041 (Fed. Cir. 1992).

B. Obviousness

In a proper obviousness determination, "[w]hether the changes from the prior art are 'minor', . . . the changes must be evaluated in terms of the whole invention, including whether the prior art provides any teaching or suggestion to one of ordinary skill in the art to make the changes that would produce the patentee's . . . device." *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 935, 15 USPQ2d 1321, 1324 (Fed. Cir.), *cert. denied*, 498 U.S. 920 (1990). This includes what could be characterized as simple changes, as in *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984) (Although a prior art device could have been turned upside down, that did not make the modification obvious unless the prior art fairly suggested the desirability of turning the device upside down.).

"[W]here the prior art gives reason or motivation to make the claimed [invention] . . . the burden (and opportunity) then falls on an applicant to rebut that *prima facie* case. Such rebuttal or argument can consist of . . . any other argument or presentation of evidence that is pertinent." *In re Dillon*, 919 F.2d 688, 692-93, 16 USPQ2d 1897, 1901 (Fed. Cir. 1990) (in banc), *cert. denied*, 500 U.S. 904 (1991). After evidence or argument is submitted by the applicant in response to an obviousness rejection, "patentability is determined on the totality of the record, by a preponderance of evidence with due consideration to persuasiveness of the argument." *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); see *In re Piasecki*, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787 (Fed. Cir. 1984) ("All evidence on the question of obviousness must be considered, both that supporting and that rebutting the *prima facie* case.").

C. Analysis

During prosecution, Chu proffered multiple reasons why placement of the SCR catalyst within the bag retainer is not merely a matter of "design choice." To support his reasoning, Chu supplied various technical articles discussing fabric filters and the stresses they undergo during pulse-jet cleaning. From this evidence, Chu contended that Szymanski does not "accommodate the frailties of the high temperature fabric" of the filter bag and therefore "one of ordinary skill in the art would not look favorably on the teachings of the Szymanski, et al patent." Accordingly, Chu concluded that one of ordinary skill in the art would not have been led to modify Szymanski from its teaching of situating the catalyst between two filter bags to placing the catalyst within the bag retainer, as claimed.

The Board concluded, however, that placement of the SCR catalyst in the bag retainer was a matter of "design choice" and that Chu's evidence and arguments to the contrary were unpersuasive because Chu's "specification is virtually silent on the matter of any purported advantage to locating the catalyst within the bag retainer" and "does not state that the claimed location of the catalyst 'inside the bag retainer' solves any particular problem or produces any unexpected result."

[2] Because the Board was required to consider the totality of the record, the Board was not free to disregard the evidence and arguments presented by Chu in response to the obviousness rejection. Additionally, the Board erred in apparently requiring Chu's evidence and arguments responsive to the obviousness rejection to be within his specification in order to be considered. To require Chu to include evidence and arguments in the specification regarding whether placement of the SCR catalyst in the bag retainer was a matter of "design choice" would be to require patent applicants to divine the rejections the PTO will proffer when patent applications are filed.

Additionally, the cases the Board relied on do not support its position that evidence and arguments must be found in the specification to be considered in an obviousness determination. In each case, the applicant failed to set forth *any* reasons why the differences between the claimed invention and the prior art would result in a different function or give unexpected results. *In re Rice*, 341 F.2d 309, 144 USPQ 476 (CCPA 1965) ("Appellants have failed to show that the change [in the claimed invention] as compared to [the reference], result in a difference in function or give unexpected results."); *In re Kuhle*, 526 F.2d 553, 555, 188 USPQ 7, 9 (CCPA 1975) ("Use of such means of electrical connection in lieu of those used in the references solves *no stated problem* and would be an obvious matter of design choice within the skill in the art." (emphasis added) (citations omitted)). *In re Lundberg*, 253 F.2d 244, 117 USPQ 190 (CCPA 1958), relied on by the Board, is also unpersuasive. In that case, the applicant argued that its valve was distinguished from the prior art because it could be opened in

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either direction. The court found this argument to be unpersuasive because "that advantage is not disclosed in appellant's application" and "the reversible operation now proposed by appellant would require modifications which are not disclosed in the application." *Lundberg*, 253 F.2d at 247, 117 USPQ at 192. None of the arguments presented by Chu would require any change in the construction of the disclosed emission control apparatus.

We have found no cases supporting the position that a patent applicant's evidence and/or arguments traversing a Section 103 rejection must be contained within the specification. There is no logical support for such a proposition as well, given that obviousness is determined by the totality of the record including, in some instances most significantly, the evidence and arguments proffered during the give-and-take of ex parte patent prosecution.

[3] From the totality of the record, we hold that placement of the SCR catalyst within the bag retainer would not have been merely a matter of "design choice." First, there is no teaching or suggestion in the prior art that would lead one of ordinary skill in the art to modify the Szymanski structure to place the SCR catalyst within a bag retainer as opposed to between two filter bags as disclosed in Szymanski. Next, Chu's technical evidence relating to the frailty of fabric filters during pulse-jet cleaning clearly counters the assertion that placement of the catalyst in the baghouse is merely a "design choice." Specifically, Chu's evidence regarding the violent "snapping" action during pulse-jet cleaning, the difficulty in stitching compartments including the capacity to withstand high temperatures, and problems encountered from variable path lengths due to settling of the catalyst particles in each compartment militates against a conclusion that placement of the SCR catalyst is merely a "design choice." See *In re Gal*, 980 F.2d 717, 25 USPQ2d 1076 (Fed. Cir. 1992) (finding of "obvious design choice" precluded where the claimed structure and the function it performs are different from the prior art).

IV. Conclusion

We therefore conclude that the subject matter of claim 1 would not have been obvious in view of Doyle and Szymanski. The rejection of independent claim 1, and necessarily of dependent claims 2, 4, and 14, is accordingly reversed.

REVERSED

Footnotes

Footnote 1. The rejections of the remaining pending claims were not appealed.

Footnote 2. In the Congressional Record, the pertinent section is Section 105(b). *See* 130 Cong. Rec. 28066 (1984). The same section, however, is listed as Section 104(b) in United States Statutes at Large. *See* 98 Stat. at 3385.

- End of Case -

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